I CLAIM:

1. A protocol for data transfer in a data network that transfers variable length payload data packets comprising:

an adaptive header that is parsed to interpret a purpose and a destination for each packet transferred within the data network, the payload packets being appended to the adaptive header to effect the transfer of the payload packets through the data network, and the adaptive header being used alone as a control packet for control messages exchanged in the data network.

2. A protocol as claimed in claim 1 wherein the adaptive header enables a data network equipped to operate under the protocol to perform at least the functions of:

transferring payload data packets as connectionless packet traffic wherein the adaptive header is used to distinguish a connectionless payload packet from a connection-based payload packet;

transferring payload data packets as connection-based data packet traffic wherein the adaptive header identifies a connection through which the payload data packets are transferred;

managing connectionless payload data packet traffic to ensure committed quality of service wherein the adaptive header identifies a quality of service associated with each connectionless payload data packet and the quality of service specifies at least an order in which the connectionless data packets are served during transfer through the data network;

establishing any of a path, a connection within a path, or an independent connection using the adaptive header as a control packet; modifying the allocated bit rate of any of a path, a connection within a path, or an independent connection using the adaptive header as a control packet; and deleting any of a path, a connection within a path, or an independent connection using the adaptive header as a control packet.

3. A protocol as claimed in claim 1 wherein the protocol supports both paths and connections for the transfer of payload data packets, and a data packet carries only one field to represent a path, a connection within a path or an independent connection, a differentiation between a path, a connection within a path and an independent connection being made at switch modules in a route from a source to a sink based on information stored in the switch modules at the time the path, the connection within a path or the independent connection is set up using the adaptive header as a control packet.

4. A protocol as claimed in claim 1 wherein the adaptive header includes a Quality of Service (QOS) index when the adaptive header is used for connectionless packet transfer to ensure a committed QOS for the connectionless packet.

5. A protocol as claimed in claim 4 wherein the QOS index is a 3 bit field that stores an integer selected from a set of 0 through 7.

6. A protocol as claimed in claim 1 wherein the adaptive header for a connectionless packet includes a

destination field that indicates a destination switch module for the connectionless packet.

7. A protocol as claimed in claim 6 wherein the destination field stores a numeric code that identifies a switch module in a Universal Transfer Mode (UTM) network.

8. A protocol as claimed in claim 1 wherein an adaptive header used as a control packet to create a path includes the following fields:

a packet type set to indicate a control packet;

a path or connection indicator set to indicate a path;

a create/delete path or connection indicator set to indicate a create function;

a grade of service index;

a new path or connection number field that stores a new path number;

a destination number that indicates a destination switch module for the path; and

a capacity in bits per second of the path to be created.

9. A protocol as claimed in claim 1 wherein each switch module traversed by the control packet grants or denies the path depending on the uncommitted capacity of links selected for the path, and the path is established only if all switch modules traversed by the path, including the destination switch module, grant the path.

10. A protocol as claimed in claim 1 wherein an adaptive header used as a control packet to create a connection within a path includes the following fields:

a packet type set to indicate a control packet;

a path or connection indicator set to indicate a connection within a path;

a create/delete a path or connection indicator set to indicate a create function;

a new path or connection number field that stores a new connection number; and

a path number to which the connection belongs.

11. A protocol for data transfer as claimed in claim 1 wherein an adaptive header used as a control packet to create an independent connection includes the following fields:

a packet type set to indicate a control packet;

a path or connection indicator set to indicate a connection;

a create/delete connection indicator set to indicate a create function;

a grade of service index;

a new connection number field that stores a new connection number;

a destination number that indicates a destination switch module for the connection;

parameters to be used by traversed switch modules, if any, for computing an Equivalent Bit Rate for the connection; and

connection admission control parameters passed to a sink to permit the sink to determine whether the connection can be accepted.

12. A protocol for data transfer as claimed in claim 1 wherein an adaptive header used as a control packet to delete a path, a connection within a path or and independent connection includes the following fields:

a packet type set to indicate a control packet;

a path or connection indicator set to indicate a respective one of a path or a connection, as appropriate;

a create/delete path or connection indicator set to indicate a delete function; and

a path or connection number field that stores a number of the path, connection within a path or independent connection to be deleted.

13. A protocol for data transfer as claimed in claim 1 wherein an adaptive header used for transferring connectionless payload data packets includes the following fields:

a packet type set to indicate a control packet;

a path or connection indicator set to indicate a connectionless packet;

a grade of service index;

a QOS index set to indicate a quality of service for the packet;

a code representing a destination switch module for the packet;

a field that stores a length in bytes of the entire packet; and

the data to be transferred.

14. A protocol for data transfer as claimed in claim 1 wherein an adaptive header used for transferring connection-based payload traffic includes the following fields:

a packet type set to indicate connection-based data packet;

an existing connection number;

a field that stores information related to a composite length in bytes or other data units of the entire packet; and

the data to be transferred.

15. A protocol as claimed in claim 14 wherein the information related to a composite length in bytes or other data units of the entire packet is an integer value.

16. A protocol for data transfer as claimed in claim 14 wherein the packet is used for transferring multi-type data and the information related to a composite length in bytes or other data units of the entire packet comprises an integer that represents an entire length in bytes of the packet, and at least one other integer that represent a length in bytes of respective portions of the multi-type data.